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ABSTRACT

Unobtrusively-gathered historical data documenting decisions made in the Navy's recruit classification process were utilized to determine whether there were significant differences between black and white classification interviewers in their treatment of black and white recruits. Decisions involving 17,752 recruits (2,413 black) and 46 classifiers (eight black) were investigated. Criteria designed to reflect type of assignment and quality of assignment were analyzed to determine if various combinations of recruit and classifier race could account for criterion variance. The nature of the classification procedure resulted in the essentially random assignment of black and white recruits to black and white classifiers. This permits a number of interesting comparisons and obviates numerous problems inherent in racial bias studies. The major hypothesis that black and white classifiers would be differentially biased in their treatment of black and white recruits was not supported. A second hypothesis that classifiers within either racial group world be differentially biased was also not supported. Sample sizes were so large that classifier bias accounting for as little as one percent of the criterion variance would have been detected as significant. Thus, there was neither statistically significant nor practically significant bias detected among classification specialists. (Author/SA)

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THE UNOBTRUSIVE MEASUREMENT OF RACIAL BIAS AMONG RECRUIT CLASSIFICATION SPECIALISTS

David C. Atwater
Edward F. Alf, Jr.
Norman M. Abrahams

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Sample sizes were so large that classifier bias accounting for as little as one percent of the criterion variance would have been detected as significant. Thus, there was neither statistically nor practically significant bias detected among classification specialists.

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FOREWORD

This research was performed under Exploratory Development Task Area RF55-521-102 and Work Unit Number NR-156-028 (The Unobtrusive Measurement of Racial Bias in Decisions Regarding Assignment of Recruits Following Basic Training). It was supported by Personnel and Training Research Programs of the Office of Naval Research.

Appreciation is expressed to the personnel from the recruit classification offices at the Recruit Training Centers, San Diego, Great Lakes, and Orlando, for their cooperation in providing data used in this investigation. The assistance of PN1 Robert J. Fangman of the recruit classification office, San Diego, was particularly helpful.

J. J. CLARKIN
Commanding Officer

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SUMMARY

Problem

Guaranteeing fair treatment for minority citizens is a problem of concern, both nationally and within the Navy. Unfortunately, research into putative instances of racial bias is frequently complicated since the sensitive nature of the topic sometimes leads to reactivity on the part of subjects. Additionally, methodological difficulties, such as obtaining matched groups of minority and nonminority subjects, are often encountered.

Within the Navy, the recruit classification process permits an investigation of possible racial inequities in job assignments while minimizing many of the problems inherent in racial bias research.

Research Objectives

The objective of this study was to investigate the effects of recruit and classifier race on the recruit classification process. The major hypothesis of interest was whether black and white classifiers would be differentially biased in their treatment of black and white recruits. Practical questions, such as whether the classifier's race affects the probability of a black or white recruit obtaining an "A" school assignment were addressed.

A second objective was to demonstrate the usefulness of non-reactive, unobtrusive measurements in investigations of sensitive topics.

Approach

Unobtrusively-gathered historical data documenting recommendations and assignments made during classification interviews were obtained from the Navy's three recruit training centers. Decisions involving 17,752 recruits (of whom 2,413 were black) and 46 classifiers (of whom 8 were black), were investigated. Criteria designed to reflect type of assignment (i.e., school versus fleet) and quality of assignment (e.g., cost of training) were analyzed to determine if various combinations of recruit and classifier race could account for criterion variance.

Results

The major hypothesis that black and white classifiers might be differentially biased in their treatment of black and white recruits was not supported. A second hypothesis that classifiers within either racial group might be differentially biased in their treatment of black and white recruits was not supported.

Conclusions

Within the limits of the conditions studied, there was no significant differential bias among classification specialists in their recommendations for, or assignments to, school training for black and white recruits. Possible generalization to classification under other circumstances, such as at Navy recruiting stations, must await replicated studies in such settings.

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THE UNOBTRUSIVE MEASUREMENT OF RACIAL BIAS AMONG RECRUIT CLASSIFICATION SPECIALISTS

BACKGROUND

Guaranteeing fair treatment for black citizens is a major national problem. One factor leading to the continued low status of some minority groups is the limited educational opportunities available to them. Bias in educational assignment can lead to limited opportunities for appropriate training, and consequently to limited job options. Equal opportunity programs, school integration programs, retraining programs, and non-discriminatory legislation are directed at assuring this fair treatment.

Navy policies and programs parallel this national concern. Navy directives (e.g., CNO/VCNO, 1971) specify that each qualified black recruit shall have the opportunity to receive the "A" school training for which he is qualified.

One of the functions of Navy directives regarding "A" school opportunities for minority members is to increase training opportunities for blacks. This, in turn, can lead to expanded job opportunities, increased job satisfaction, increased lifetime earnings, and a generally higher socioeconomic status for the groups involved.

The Role of the Classification Specialist

Although many phases of the Navy assignment process are fairly automatic and computerized, there are still phases in which human judgment and human interaction play a major role. In anything as important as determining what may well be an individual's lifetime career, it is important to take advantage of all the resources of human intuition and guidance, as well as all scientific knowledge regarding the relations of aptitudes and interests to performance.

Perhaps the most crucial human role in the Navy assignment process is that played by the Navy classification specialists.

These specialists work with the individual recruits, considering their abilities and interests, backgrounds, stated preferences, and other less tangible factors, in arriving at a recommended recruit assignment. It is this classifier who, in borderline cases, will make the difference between an appropriate school assignment, or no school assignment at all. His particular talents and expertise may well make the difference between the opportunity for enhanced socioeconomic status, and the denial of that opportunity. Thus, it is important to focus attention on the way the classifier plays his role in the assignment process.

Focus of the Study

The present study focuses on: (1) the development and measurement of various indexes that reflect the quality of recommendations and final assignments received by each recruit, and (2) the effects of interviewer race on these indexes for black and white recruits. The five indicators utilized in assessing quality of assignment include: (1) school versus non-school assignment, (2) cost of school training, (3) length of school training, (4) racial composition of assignment, and (5) ratio of school recommendations to all recommendations. A classifier's bias cannot be assessed on these indicators in an absolute sense, but individual classifiers within a race may be compared to each other and black classifiers may be compared with white classifiers in their treatment of black and white recruits. Differential bias will be shown if the criterion scores of black recruits relative to those of white recruits are associated with the race of the classifier or with individual classifiers within race.

The Need for Empirical Research

The notion that there may be differences in bias among classifiers is largely speculation at the moment, because heretofore no research has been performed to investigate the possibility that such bias exists. Opinions have been expressed that black classifiers will send more black recruits to school than will white classifiers; others assert just the opposite. The present research was motivated by the belief that the examination of empirical evidence might be useful in resolving this issue.

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Difficulties in Studying Racial Bias

Several difficulties, such as reliance on self-report data and inadequate experimental control, have interfered with the objective study of sensitive topics such as bias. Some of these difficulties are discussed below.

Distortions in self-report data. Sattler (1970) cites numerous cases where the verbal reports of subjects are influenced by the race of the interviewer. Distorted reporting may occur when (1) two subjects interact (for example, a client and a therapist of different races) or (2) an investigator and a subject interact (for example, when a client evaluates his client-therapist interaction for an outside investigator). Both types of distortion are potential problems in investigating racial bias.

Confounding of variables. In comparing minority and nonminority groups, measurement of racial bias is often confounded by group differences on other variables. For example, in measuring bias, it has often been necessary to compare the treatment received by conveniently available groups of minority and nonminority individuals. Frequently, such groups differ not only in race but also in terms of average educational, occupational, and income levels. To the extent that such variables do influence the decisions made or treatments received by individuals, any measure of bias will be confounded. Even if the groups could be matched on these variables, there would remain a host of other variables, unknown and little imagined, upon which the groups would still differ.

Reactive effects. When subjects are aware that their behavior is being studied, they are likely to modify their behavior accordingly. Thus, the activities and hypotheses of the investigator may distort the process being observed.

Unobtrusive Measurement of Racial Bias

The Navy recruit classification procedure provides an excellent means for minimizing the difficulties outlined above. During the classification procedure, enlisted personnel appear together as a

company, at a specified time, for individual classification interviews. The recruits, both black and white, are assigned to classifiers, who are also black or white. The assignment of recruits to classifiers is designed to preclude recruits from choosing the classifier they will see, and to assure that classifiers do not pick the recruits they will interview.

Informal observation of this procedure led the investigators to believe that an essentially random assignment process would result. It was expected that each classifier would interview a group of recruits in which the proportion of minority recruits would be equivalent. Other characteristics of the group of recruits should also be equivalent. For example, the black recruits interviewed by white classifiers should have aptitude test scores and experiences equivalent to those interviewed by black classifiers. If these assumptions can be verified, several interesting comparisons are possible. For example, the number and quality of school assignments given to black recruits by black and by white classifiers could be contrasted. Data for the study can be obtained from existing Navy records containing assignment recommendations made by the classifier and the actual assignment each recruit received.

Absence of self-report data. Since the necessary information can be obtained from Navy records, there is no need to gather distortion-prone self-report data.

Absence of confounding. By focusing on the differential treatment of random groups of black and white recruits, confounding due to differences in variables such as educational, occupational, and income levels would be overcome. The randomization procedure would eliminate the necessity for matching, which would be ineffective in any event.

Absence of reactive effects. Since historical data could be used, the behaviors being investigated would already have occurred. As a consequence, the possibilities of the experimenter influencing the subjects' responses is precluded.

Disadvantages in using archival data. There are, of course, disadvantages when using data gathered by others. There is always risk that unknown factors present when the data were produced may cause selective deposit of material. Additionally, there may be temporal or geographic variation in the data-gathering procedures which, if unknown, may be misleading. Finally, the data as originally produced may not be in the most convenient form for the investigator's analyses. In the present study, it was felt that these potential disadvantages were more than offset by the advantages of non-reactivity and low cost.

PURPOSE

The purpose of the present study was to determine whether there are significant differences in racial bias in "A" school assignment practices among recruit classification specialists. More specifically, the purpose was to determine whether these practices differ significantly between black and white classifiers, and among classifiers of the same race.

PROCEDURE

The present study was conducted unobtrusively within the general framework of the ongoing classification and assignment process. Information regarding the recommended and actual assignments of recruits, the racial membership and test scores of recruits, and the racial membership of classifiers was obtained from routinely collected Navy records.

Recruit Classification and Assignment

Figure 1 provides a schematic representation of the Navy recruit classification and assignment process in use at the time of

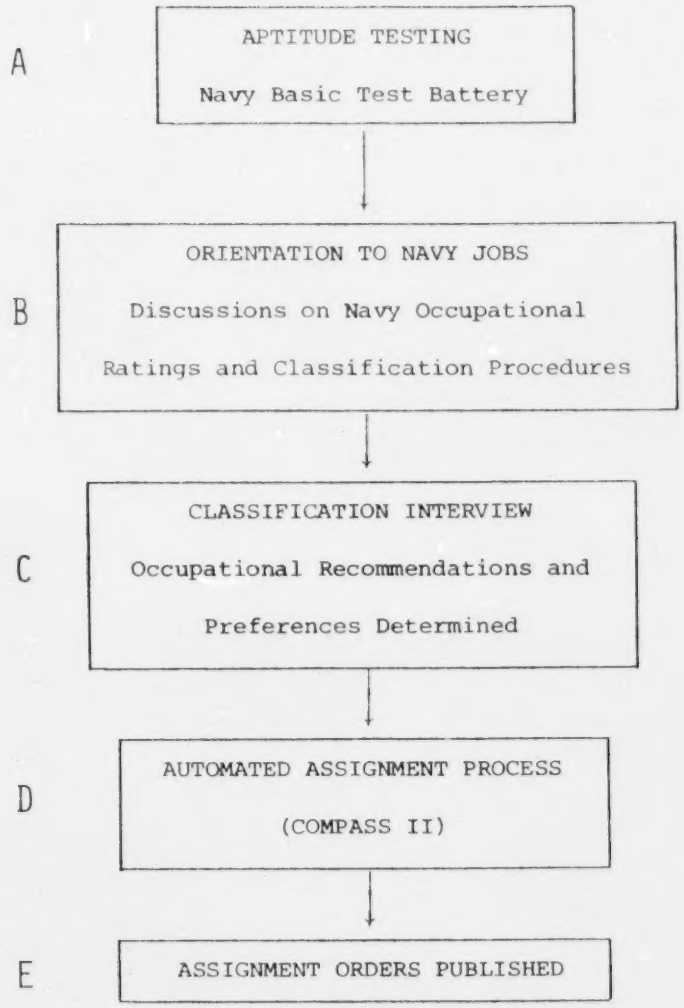

Fig. 1. Recruit classification and assignment sequence.

this study. The five stages, labeled A through E in Figure 1, are described briefly below.

a. During the first week of the recruit training cycle, recruits are administered a battery of tests measuring verbal, mechanical, clerical, and arithmetic abilities. One or more special tests may also be included. These test scores are used by the classification interviewer in formulating assignment recommendations.

b. In preparation for their classification interview, recruits receive several hours of formal orientation to Navy jobs. They attend several classes in which Navy occupational ratings are discussed at length. They are also given information about the classification interview, so they will know how their expressed job preferences are taken into account by the interviewer, and what options exist.

c. The next step is the classification interview proper. During the interview the classifier makes up to five school and/or fleet assignment recommendations for each recruit. These recommendations are based on Basic Test Battery (BTB) and special test scores, civilian job experience, educational background, hobbies, and interests. Each recommendation is given a Recommendation Level Code (RLC) that indicates, on a 5-point scale, the interviewer's appraisal of the recruit's fitness for the recommended assignment.

d. The classifier's recommendations are then considered in a computerized system, COMPASS II, which determines the actual assignments. The objectives of the system are to maximize quota accommodations given the pool of talent available, minimize transportation costs, and maximize both adherence to interviewer recommendations, and the probability of success in schools.

e. The school assignments are transmitted to the Naval Training Centers near the end of recruit training, usually by the end of the eighth week.

Emphasis of the Present Study

The present study will concentrate on the events surrounding the classification interview (stage C, Figure 1), and on the eventual actual assignment of the recruits (stage E, Figure 1).

Subjects

Samples were gathered at the three Naval Training Centers at San Diego, Great Lakes, and Orlando. Subjects were classification interviewers and the recruits they classified during specified 4 month periods.

The exact time period was chosen for each center to maximize the numbers of black classifiers available through the entire time period investigated. At San Diego and Great Lakes, the period was January through April, 1972. At Orlando, the time period was January through April, 1973. The race of the recruit and of the classification interviewer were independent variables of interest.

Recruits. There are three general categories of recruit subjects.

(1) Specific school guarantee. These recruits are given a specific "A" school guarantee by the recruiter in the field. Since the classifier does not determine their eventual assignment, these recruits were not included in the study.

(2) Occupational specialty guarantee. These recruits are guaranteed "A" school training within a general occupational area. For most occupational specialties, there are several "A" schools available within the area. The classifier makes recommendations that may determine which of these schools the recruit will attend. Recruits in occupational specialty areas where, because of quota demands, only one school was available, were eliminated from the study since the classifier had no impact on their final assignment.

(3) Non-school guarantee. These men arrive at recruit training with no "A" school guarantee of any type. If results of tests administered during recruit training indicate they are school eligible, they may be recommended for "A" school by the classifier.

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Classification interviewers. The recommendations and assignment made by classification interviewers on duty during the time period investigated at each training center were tabulated. Classifiers in an "under-instruction" capacity were eliminated from the analyses since they, in general, interviewed relatively few recruits, and those they did interview were not randomly assigned to them.

Table 1 presents the number of recruits and classifiers at each training center. Entries for recruits indicate the total number of occupational specialty and non-school guarantee recruits included in the study. Entries within parentheses are the number of non-school guarantee recruits in each sample. This subset of non-school guarantee recruits was used in analyzing the "A" school assignment criterion (described below). All other criteria utilized the combined sample of occupational specialty and non-school guarantee recruits.

Criteria

Five criterion measures, as described below, were used in the present study. The first four criteria were derived from the actual final assignment received by each recruit. The fifth criterion variable, recommendation index, was derived solely from the recommendations given to each recruit by his classifier, irrespective of his actual assignment.

"A" school assignment. For each non-school guaranteed recruit, whether or not he finally received an "A" school assignment was recorded as a dichotomous criterion.

Cost of "A" school training. For each recruit assigned to "A" school, the cost for his particular "A" school training was recorded. This cost information was obtained from a Bureau of Naval Personnel publication (NAVPERS 18660). Fleet assignees received an "A" school training cost value of zero.

Length of "A" school training. For each recruit assigned to "A" school, the length of training at the particular "A" school

TABLE 1

Number of Recruits and Classifiers at Each
Naval Training Center

Subjects	Training Centers			
	San Diego	Great Lakes	Orlando	Totals
Recruits				
Black	439 (387)[a]	989 (886)	985 (828)	2,413 (2,101)
White	5,836 (2,912)	4,638 (2,736)	4,865 (2,457)	15,339 (8,105)
Total	6,275 (3,299)	5,627 (3,622)	5,850 (3,285)	17,752 (10,206)
Classifiers				
Black	3	1	4	8
White	16	13	9	38
Total	19	14	13	46

Note.--

[a]Numbers in parentheses indicate the number of non-school guaranteed recruits within each category.

to which he was assigned was recorded. This school length information was obtained from a Bureau of Naval Personnel publication (NAVPERS 18660). Fleet assignees received a length of "A" school training value of zero.

Racial saturation index. The proportion of black recruits assigned to each school was recorded. The racial saturation index value for any given recruit was the proportion of black recruits in the school to which he was assigned. For a recruit assigned to the fleet, his racial saturation index was the proportion of black recruits in the sample who were assigned directly to the fleet.

Recommendation index. The recommendation index (RI) is computed using the formula:

$$RI = \frac{\Sigma \text{RLC for "A" school recommendations}}{\Sigma \text{RLC for all recommendations}},$$

where RLC stands for a 5-point recommendation level code. This formula, which yields scores ranging from .00 to 1.00, was devised to capture, as closely as possible, the likelihood that an individual recruit with a given set of recommendations would be assigned by the computer to "A" school. If, for example, a recruit had no school recommendations, he would receive an RI of .00, while a recruit with only school recommendations would have an RI of 1.00. Recruits with mixed school and nonschool recommendations receive intermediate RI scores. It was hoped that this measure would provide some insight into the classification tactics used by the interviewers.

Auxiliary Measures

General Classification Test (GCT) and Arithmetic Test (ARI) scores from the Navy BTB were recorded for each recruit in the present study. The sum of these two test scores (hereafter referred to as GCT + ARI) is often used as an index of general intellectual level. As described below, this sum was used to compare the average quality of recruits interviewed by each classifier.

Statistical Analysis

Randomness of assignment. Initially, two preliminary analyses were performed to check on the randomness of assignment of recruits to classifiers. First, a chi square analysis was performed to determine whether the proportion of black recruits seen by each classifier differed significantly. Second, an analysis of variance using GCT + ARI as the dependent variable was performed to determine if the quality of recruits differed significantly among classifiers.

Racial bias. For each criterion of interest, an overall analysis was performed as a 3-factor hierarchical design. Factor A was the race of the classifier, factor B was the race of the recruit, and factor C was the individual classifier, nested under classifier race. In this design, factors A and B are regarded as fixed factors, and factor C is regarded as a random factor.

Table 2 presents the sources of variance, together with the expected mean squares for the complete design. The terminology in Table 2 is that employed by Myers (1972). The expectations for the mean squares were derived from Winer (1971, p. 363, Table 15.12-2).

In the present analysis, it was necessary to employ an unweighted mean analysis at two levels of the design, because: (a) different numbers of classifiers were nested under each race, and (b) different numbers of black and white recruits were nested under each classifier. The procedures for handling these problems are outlined in Winer (1962, pp. 374-378) and in Myers (1966, pp. 104-111).

From Table 2, it can be seen that A should be tested against C/A, B and AB against BC/A, and C/A and BC/A against S/ABC.

RESULTS

Randomness of Assignment

Chi square analyses. The chi square analyses to verify the randomness of assignment of recruits to black and white classifiers

TABLE 2

Expected Mean Squares for Three-Factor Design: Factors A and B Fixed; Factor C Random, and Nested Under Factor A

Source of Variance	Expected Mean Square
A	$\sigma_e^2 + nb\sigma_c^2 + nbc\theta_A^2$
C/A	$\sigma_e^2 + nb\sigma_c^2$
B	$\sigma_e^2 + n\sigma_{BC}^2 + nac\theta_B^2$
AB	$\sigma_e^2 + n\sigma_{BC}^2 + nC\theta_{AB}^2$
BC/A	$\sigma_e^2 + n\sigma_{BC}^2$
S/ABC	σ_e^2

Note. In this table there are a levels of A, b levels of B, c levels of C, and n S's per treatment group.

were performed separately for each training center. The results of these analyses are presented in Table 3.

It can be seen that, although these values are nonsignificant at San Diego and Orlando, the chi square value at Great Lakes was significant beyond the .001 level. Information obtained from the Great Lakes classifiers indicated that, for a period of time, black recruits were lining up outside the black classifier's door, rather than going randomly to the next available classifier. This, among other factors, distorted the randomness of assignment of Great Lakes.

To check further on the randomness of assignment, a more detailed analysis was performed to determine whether the proportions of black and white recruits interviewed by each classifier were significantly different. The results of these analyses are presented in Table 4.

Again, it can be seen that the chi square values for the San Diego and Orlando analyses are nonsignificant, whereas the chi square value for Great Lakes is again highly significant. Although this finding is important, it jeopardizes the research design only if a concomitant deviation is found in the quality of recruits assigned to classifiers.

Analyses of variance. Analyses of variance were performed on the sum GCT + ARI for each recruit to determine whether the quality of recruits interviewed differed significantly among classifiers. These analyses were performed separately for black and white recruits at each training center. The analysis of variance summary table is presented in Table 5.

Inspection of Table 5 reveals that the F tests are not significant at all three training centers. Thus, there was no significant difference in the quality of recruits seen by different classifiers within each of the three training centers.

Summary of random assignment analyses. No evidence was found at San Diego or Orlando to reject the hypothesis of random assignment. At Great Lakes, although there were significant differences in the proportion of black recruits assigned to each classifier, there appear to be no significant differences in the quality of recruits seen by different classifiers, thus permitting analysis of the bias criteria.

TABLE 3

Chi Square Analyses for Random Assignment of Black and White Recruits to Classifiers

	San Diego			
	Black Recruits	White Recruits	Totals	χ^2
Black Classifiers	54	659	713	.412
White Classifiers	385	5,177	5,562	
	439	5,836	6,275	

	Great Lakes			
	Black Recruits	White Recruits	Totals	χ^2
Black Classifiers	65	176	241	15.341***
White Classifiers	924	4,462	5,386	
	989	4,638	5,627	

	Orlando			
	Black Recruits	White Recruits	Totals	χ^2
Black Classifiers	375	1,752	2,127	1.500
White Classifiers	610	3,113	3,723	
	985	4,865	5,850	

***Significant at the .001 level.

TABLE 4

Chi Square Values Based on Number of Black and White Recruits Assigned to Each Classifier by Training Center

Training Center	χ^2	df	Significance
San Diego	23.47	18	----[a]
Great Lakes	39.12	13	.001
Orlando	17.85	12	----

Note.

[a]Indicates a nonsignificant chi square value.

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TABLE 5

Analyses of Variance of Mean Test Scores (GCT + ARI) of Black and White Recruits Seen by Each Classifier

San Diego

Sample	Source	df	SS	MS	F
Black Recruits	Total	438	91,820		
	A	18	2,892	160.7	.76
	S/A	420	88,928	211.7	
White Recruits	Total	5,835	1,490,028		
	A	18	5,198	288.8	1.13
	S/A	5,817	1,484,830	255.3	

Great Lakes

Sample	Source	df	SS	MS	F
Black Recruits	Total	988	164,262		
	A	13	1,118	86.0	.51
	S/A	975	163,144	167.3	
White Recruits	Total	4,637	1,267,474		
	A	13	5,841	449.3	1.65
	S/A	4,624	1,261,633	272.8	

Orlando

Sample	Source	df	SS	MS	F
Black Recruits	Total	984	143,732		
	A	12	1,373	114.4	.78
	S/A	972	142,359	146.5	
White Recruits	Total	4,864	1,150,591		
	A	12	3,941	328.4	1.39
	S/A	4,852	1,146,650	236.3	

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Racial Bias

Descriptive statistics. For each criterion, an average score was computed separately for the black and white recruits seen by each classifier at each training center. These means, together with the number of observations upon which each mean was based, are presented in Tables 6 through 20.

Analyses of variance. A separate 3-factor analysis of variance was performed on each of the five criteria at each training center, thereby providing a total of 15 analyses. In each analysis, factor A represented the race of the classifier, factor B represented the race of the recruit, and factor C represented the individual classifier within each race. The summary tables for these analyses are presented in Tables 21 through 25.

Overall summary table. In order to present the "A" school criteria findings more concisely, the F ratios for all five criteria were summarized in a single table. This summary is presented in Table 26.

Bias related to classifier race. A major hypothesis of the present study was that black and white classifiers might be differentially biased in their treatment of black and white recruits. This hypothesis was in no way supported by the present study.

If such bias existed, it would be revealed in the AB interactions of the analyses of variance based on the "A" school criteria. At each training center, and for each "A" school criterion, this AB interaction term was nonsignificant. In fact, about half of the F ratios for this interaction were greater than 1.00, and half were less. This pattern is closely consistent with the null hypothesis that there is no bias related to the classifier's race.

Bias among individual classifiers. A second hypothesis of interest in the present study was that classifiers within either racial group might be differentially biased in their treatment of black and white recruits. The present study offers no support for this hypothesis.

TABLE 6

Average Criterion Scores for Non-School Guaranteed Black and White Recruits Seen by Each Classifier: San Diego Sample; Final Assignment Criterion
(n=3,299)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.1000	10	.5615	130
	2	.1600	25	.5938	160
	3	.3000	10	.6094	64
White	1	.2857	35	.5614	228
	2	.1154	26	.5871	201
	3	.3600	25	.5670	194
	4	.2857	14	.4388	98
	5	.2500	20	.5828	175
	6	.3548	31	.6042	240
	7	.0000	8	.3415	41
	8	.0000	3	.4054	37
	9	.3448	29	.4798	198
	10	.1500	20	.5492	193
	11	.3077	26	.6100	200
	12	.1818	22	.4661	118
	13	.4500	20	.5771	201
	14	.3793	29	.5846	195
	15	.0000	4	.6061	33
	16	.1667	30	.6456	206

TABLE 7

Average Criterion Scores for Non-School Guaranteed Black and White Recruits Seen by Each Classifier: Great Lakes Sample; Final Assignment Criterion
(n=3,622)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2586	58	.3738	107
White	1	.1935	31	.2500	88
	2	.1875	96	.4489	323
	3	.0923	65	.3250	200
	4	.0635	63	.3656	186
	5	.0690	58	.4670	197
	6	.0536	112	.4010	384
	7	.1587	63	.4479	192
	8	.1023	88	.3906	256
	9	.2368	76	.5030	165
	10	.1064	47	.4247	186
	11	.0000	8	.3404	47
	12	.1719	64	.3774	204
	13	.2456	57	.4279	201

TABLE 8

Average Criterion Scores for Non-School Guaranteed Black and White Recruits Seen by Each Classifier: Orlando Sample; Final Assignment Criterion
(n=3,285)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.1455	55	.2678	183
	2	.1410	78	.2353	204
	3	.1569	102	.2939	262
	4	.1053	76	.2467	227
White	1	.0877	57	.2643	193
	2	.0694	72	.1972	213
	3	.0000	9	.0857	35
	4	.0517	58	.2353	187
	5	.2041	49	.1414	99
	6	.0849	106	.2826	361
	7	.0833	24	.1077	65
	8	.0901	111	.2476	315
	9	.0323	31	.3451	113

TABLE 9

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: San Diego Sample; Cost Criterion (n=6,275)

Classifier Race	Classifier Number	Black Recruits Mean	Black Recruits n	White Recruits Mean	White Recruits n
Black	1	1796.08	12	2176.93	230
	2	521.45	31	2023.19	298
	3	752.73	11	2360.60	131
White	1	548.08	36	2245.03	454
	2	1257.35	31	2212.50	420
	3	962.39	26	2292.40	403
	4	960.56	16	2133.64	200
	5	1330.50	26	2183.95	378
	6	1227.46	35	2246.41	424
	7	0.00	8	2306.98	81
	8	185.32	5	1671.51	53
	9	1227.12	33	2088.54	381
	10	434.71	21	2221.61	380
	11	917.43	30	2426.88	434
	12	455.46	24	2246.75	262
	13	951.35	23	1997.06	399
	14	1354.29	34	2128.20	393
	15	0.00	4	2434.21	85
	16	461.06	33	2526.36	430

TABLE 10

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Great Lakes Sample; Cost Criterion (n=5,627)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	678.83	65	1774.97	176
White	1	457.09	34	1579.85	143
	2	682.50	109	1994.78	551
	3	352.38	71	1915.02	350
	4	354.21	70	1995.63	324
	5	351.02	66	2014.45	319
	6	299.74	123	2049.59	653
	7	616.39	70	1947.42	323
	8	605.72	105	1987.76	439
	9	687.49	83	2197.40	263
	10	432.35	51	2280.74	352
	11	0.00	8	1611.99	74
	12	685.03	73	1939.80	350
	13	653.59	61	1836.09	321

TABLE 11

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Orlando Sample; Cost Criterion (n=5,850)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	1019.13	68	2348.86	387
	2	1129.90	105	2135.95	424
	3	758.04	120	2193.65	517
	4	463.35	82	1934.24	424
White	1	657.64	69	2101.49	395
	2	483.14	79	2002.04	410
	3	814.82	11	1972.72	71
	4	525.46	65	2069.69	343
	5	626.50	52	1996.46	187
	6	794.41	131	1986.26	688
	7	595.64	25	1417.41	106
	8	882.48	138	2111.73	641
	9	674.35	40	2660.81	272

TABLE 12

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: San Diego Sample; Length Criterion (n=6,275)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	6.75	12	11.08	230
	2	2.90	31	10.36	298
	3	4.18	11	13.16	131
White	1	2.89	36	11.70	454
	2	6.06	31	11.43	420
	3	4.00	26	11.97	403
	4	5.19	16	11.02	200
	5	6.69	26	11.70	378
	6	6.37	35	11.66	424
	7	0.00	8	12.19	81
	8	5.60	5	8.57	53
	9	6.15	33	10.77	381
	10	2.19	21	11.07	380
	11	4.67	30	12.51	434
	12	2.46	24	11.90	262
	13	5.13	23	10.55	399
	14	6.50	34	11.07	393
	15	0.00	4	12.35	85
	16	2.58	33	12.82	430

TABLE 13

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Great Lakes Sample; Length Criterion (n=5,627)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	3.79	65	9.90	176
White	1	2.71	34	7.98	143
	2	3.62	109	10.42	551
	3	1.87	71	9.71	350
	4	1.77	70	10.42	324
	5	2.02	66	10.08	319
	6	1.60	123	10.68	653
	7	3.21	70	10.19	323
	8	3.10	105	10.49	439
	9	3.60	83	10.78	263
	10	2.35	51	11.71	352
	11	0.00	8	8.47	74
	12	3.59	73	9.73	350
	13	3.49	61	9.92	321

TABLE 14

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Orlando Sample; Length Criterion (n=5,850)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	5.60	68	11.76	387
	2	5.60	105	11.07	424
	3	3.94	120	11.30	517
	4	2.49	82	9.78	424
White	1	3.52	69	10.78	395
	2	2.62	79	10.54	410
	3	4.27	11	10.52	71
	4	2.73	65	10.38	343
	5	2.98	52	9.67	187
	6	3.97	131	10.32	688
	7	2.88	25	7.08	106
	8	4.51	138	10.97	641
	9	3.45	40	13.60	272

TABLE 15

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: San Diego Sample; Saturation Criterion (n=6,275)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2138	12	.1102	230
	2	.2173	31	.0986	298
	3	.2100	11	.0958	131
White	1	.2145	36	.1020	454
	2	.2218	31	.0986	420
	3	.2012	26	.1014	403
	4	.1982	16	.1128	200
	5	.1898	26	.0969	378
	6	.1859	35	.1043	424
	7	.2730	8	.1263	81
	8	.1908	5	.1464	53
	9	.1998	33	.1114	381
	10	.2457	21	.1000	380
	11	.1897	30	.0926	434
	12	.2329	24	.1045	262
	13	.1697	23	.0993	399
	14	.1910	34	.1034	393
	15	.2730	4	.0765	85
	16	.2264	33	.0922	430

TABLE 16

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Great Lakes Sample; Saturation Criterion (n=5,627)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2179	65	.1404	176
White	1	.2256	34	.1568	143
	2	.2193	109	.1295	551
	3	.2477	71	.1440	350
	4	.2439	70	.1299	324
	5	.2412	66	.1312	319
	6	.2496	123	.1367	653
	7	.2252	70	.1317	323
	8	.2258	105	.1293	439
	9	.2237	83	.1211	263
	10	.2421	51	.1218	352
	11	.2730	8	.1451	74
	12	.2207	73	.1348	350
	13	.2230	61	.1390	321

TABLE 17

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Orlando Sample; Saturation Criterion (n=5,850)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2138	68	.1250	387
	2	.1987	105	.1308	424
	3	.2170	120	.1285	517
	4	.2390	82	.1365	424
White	1	.2278	69	.1306	395
	2	.2430	79	.1402	410
	3	.2334	11	.1455	71
	4	.2413	65	.1427	343
	5	.2251	52	.1498	187
	6	.2254	131	.1316	688
	7	.2530	25	.1721	106
	8	.2217	138	.1316	641
	9	.2291	40	.1076	272

TABLE 18

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: San Diego Sample; Recommendation Criterion (n=6,275)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.1388	12	.4375	230
	2	.2208	31	.4273	298
	3	.2610	11	.4692	131
White	1	.1956	36	.4848	454
	2	.1189	31	.4915	420
	3	.3002	26	.5184	403
	4	.2027	16	.4038	200
	5	.2782	26	.4765	378
	6	.2498	35	.4210	424
	7	.0000	8	.4040	81
	8	.4000	5	.3364	53
	9	.3008	33	.4711	381
	10	.1227	21	.4643	380
	11	.2383	30	.5023	434
	12	.2152	24	.4729	262
	13	.3104	23	.4965	399
	14	.3456	34	.5312	393
	15	.0000	4	.5302	85
	16	.1826	33	.4726	430

TABLE 19

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Great Lakes Sample; Recommendation Criterion (n=5,627)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2764	65	.3858	176
White	1	.2235	34	.3018	143
	2	.2040	109	.4405	551
	3	.1045	71	.3691	350
	4	.1264	70	.3918	324
	5	.1369	66	.4612	319
	6	.1119	123	.4177	653
	7	.1427	70	.4085	323
	8	.1893	105	.3941	439
	9	.2396	83	.4175	263
	10	.1217	51	.3893	352
	11	.0000	8	.4128	74
	12	.1638	73	.3717	350
	13	.2267	61	.4703	321

TABLE 20

Average Criterion Scores for Black and White Recruits Seen by Each Classifier: Orlando Sample; Recommendation Criterion (n=5,850)

Classifier Race	Classifier Number	Black Recruits		White Recruits	
		Mean	n	Mean	n
Black	1	.2163	68	.3204	387
	2	.2718	105	.3238	424
	3	.1981	120	.3182	517
	4	.1280	82	.3358	424
White	1	.1577	69	.3522	395
	2	.1099	79	.2809	410
	3	.0606	11	.2352	71
	4	.1064	65	.3293	343
	5	.2368	52	.2773	187
	6	.1950	131	.3348	688
	7	.0542	25	.3360	106
	8	.1850	138	.3287	641
	9	.1587	40	.3540	272

TABLE 21

Analysis of Variance Summary Tables for the Final Assignment Criterion

San Diego Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0005	1	.0005	---[a]
C/A: Classifier Within Race	.3008	17	.0177	1.69*
B: Recruit Race	.6412	1	.6412	75.26***
AB	.0101	1	.0101	1.19
BC/A	.1448	17	.0085	---
S/ABC	34.2800	3261	.0105	

Great Lakes Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0052	1	.0052	---
C/A: Classifier Within Race	.0778	12	.0065	2.03*
B: Recruit Race	.0683	1	.0683	18.16**
AB	.0108	1	.0108	2.87
BC/A	.0451	12	.0038	1.19
S/ABC	11.6300	3594	.0032	

Orlando Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0161	1	.0161	4.38
C/A: Classifier Within Race	.0403	11	.0037	1.38
B: Recruit Race	.0919	1	.0919	20.85***
AB	.0000	1	.0000	---
BC/A	.0485	11	.0044	1.64
S/ABC	8.7418	3259	.0027	

Note.

[a]Indicates F ratio equal to, or less than, 1.00.

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

TABLE 22

Analysis of Variance Summary Tables for the School Cost Criterion

San Diego Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	68,634.4	1	68,634.4	---
C/A: Classifier Within Race	2,310,391.5	17	135,905.4	---
B: Recruit Race	8,581,695.9	1	8,581,695.9	56.70***
AB	98,678.4	1	98,678.4	---
BC/A	2,572,924.3	17	151,348.5	1.06
S/ABC	890,757,689.0	6237	142,818.3	

Great Lakes Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	379.0	1	379.0	---
C/A: Classifier Within Race	650,620.4	12	54,218.0	1.04
B: Recruit Race	3,068,919.0	1	3,068,919.0	118.83***
AB	66,588.4	1	66,588.4	2.58
BC/A	309,903.4	12	25,825.0	---
S/ABC	290,993,671.0	5599	51,972.0	

Orlando Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	114,582.5	1	114,582.5	1.56
C/A: Classifier Within Race	806,646.0	11	73,312.0	1.34
B: Recruit Race	9,894,830.1	1	9,894,830.1	224.70***
AB	3,760.1	1	3,760.1	---
BC/A	484,525.1	11	44,048.0	---
S/ABC	319,058,142.0	5824	54,783.0	

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

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TABLE 23

Analysis of Variance Summary Tables for the School Length Criterion

San Diego Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.30	1	.30	---
C/A: Classifier Within Race	35.40	17	2.08	---
B: Recruit Race	255.71	1	255.71	66.12***
AB	.25	1	.25	---
BC/A	65.74	17	3.87	1.15
S/ABC	20,948.40	6237	3.36	

Great Lakes Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.58	1	.58	---
C/A: Classifier Within Race	16.22	12	1.35	1.08
B: Recruit Race	86.24	1	86.24	118.50***
AB	.93	1	.93	1.38
BC/A	8.74	12	.73	---
S/ABC	7,025.31	5599	1.25	

Orlando Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	3.21	1	3.21	1.50
C/A: Classifier Within Race	23.52	11	2.14	1.60
B: Recruit Race	252.89	1	252.89	242.10***
AB	1.94	1	1.94	1.86
BC/A	11.49	11	1.04	---
S/ABC	7,845.60	5824	1.34	

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

TABLE 24

Analysis of Variance Summary Tables for the Saturation Criterion

San Diego Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0000	1	.0000	---
C/A: Classifier Within Race	.0078	17	.0005	1.25
B: Recruit Race	.0615	1	.0615	107.10***
AB	.0000	1	.0000	---
BC/A	.0098	17	.0006	1.50
S/ABC	2.2140	6237	.0004	

Great Lakes Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0001	1	.0001	---
C/A: Classifier Within Race	.0025	12	.0002	1.49
B: Recruit Race	.0147	1	.0147	108.74***
AB	.0002	1	.0002	2.00
BC/A	.0016	12	.0001	---
S/ABC	.8144	5599	.0001	

Orlando Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0009	1	.0009	3.04
C/A: Classifier Within Race	.0032	11	.0003	1.92*
B: Recruit Race	.0454	1	.0454	487.86***
AB	.0001	1	.0001	---
BC/A	.0010	11	.0001	---
S/ABC	.8882	5824	.0002	

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

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TABLE 25

Analysis of Variance Summary Tables for the Recommendation Criterion

San Diego Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0015	1	.0015	---
C/A: Classifier Within Race	.1125	17	.0066	1.28
B: Recruit Race	.3016	1	.3016	39.51***
AB	.0000	1	.0000	---
BC/A	.1298	17	.0076	1.30
S/ABC	36.5908	6237	.0059	

Great Lakes Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0052	1	.0052	1.69
C/A: Classifier Within Race	.0367	12	.0031	1.39
B: Recruit Race	.0601	1	.0601	19.34***
AB	.0092	1	.0092	2.97
BC/A	.0373	12	.0031	1.41
S/ABC	12.6434	5599	.0022	

Orlando Sample

Source of Variation	SS	df	MS	F
A: Classifier Race	.0072	1	.0072	2.56
C/A: Classifier Within Race	.0310	11	.0028	1.43
B: Recruit Race	.1202	1	.1202	56.02***
AB	.0039	1	.0039	1.81
BC/A	.0236	11	.0021	1.09
S/ABC	11.4740	5824	.0020	

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

TABLE 26

Grand Summary Table: Bias Criteria

Source of Variation	F Ratios					
	Final Assignment			School Cost		
	San Diego	Great Lakes	Orlando	San Diego	Great Lakes	Orlando
A: Classifier Race	---	---	4.38	---	---	1.56
C/A: Classifier Within Race	1.69*	2.03*	1.38	---	1.04	1.34
B: Recruit Race	75.26***	18.16**	20.85***	56.70***	118.83***	224.70***
AB	1.19	2.87	---	---	2.58	---
BC/A	---	1.19	1.64	1.06	---	---
S/ABC						

(Continued on next page)

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

TABLE 26 (continued)

Source of Variation	F Ratios					
	School Length			Racial Saturation		
	San Diego	Great Lakes	Orlando	San Diego	Great Lakes	Orlando
A: Classifier Race	---	---	1.50	---	---	3.04
C/A: Classifier Within Race	---	1.08	1.60	1.25	1.49	1.92*
B: Recruit Race	66.12***	118.50***	242.10***	107.10***	108.74***	487.86***
AB	---	1.38	1.86	---	2.00	---
BC/A	1.15	---	---	1.50	---	---
S/ABC						

(Continued on next page)

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

TABLE 26 (continued)

Source of Variation	F Ratios — Recommendation Index		
	San Diego	Great Lakes	Orlando
A: Classifier Race	---	1.69	2.56
C/A: Classifier Within Race	1.28	1.39	1.43
B: Recruit Race	39.51***	19.34***	56.02***
AB	---	2.97	1.81
BC/A	1.30	1.41	1.09
S/ABC			

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

Bias among classifiers would be revealed by the BC/A interactions of the analyses of variance based on the "A" school criteria. It can be seen by examining Table 26 that none of the 15 BC/A interactions computed reached the .05 level of significance, and that 10 of the 15 F ratios were less than 1.00. Thus, there is no reason to believe that individual classifiers differ significantly in their differential assignments of black and white recruits.

Other Significant Factors Related to "A" School Criteria

Recruit race. Table 26 reveals a large and significant main effect for factor B, recruit race, for all criteria. This indicates that in general, white recruits are more likely to receive "A" school assignments than are black recruits. Further, the training received by white recruits is likely to be longer, more expensive, and in ratings where there are fewer black recruits.

This finding does not represent differential bias, since it characterizes black and white classifiers alike, and is characteristic of classifiers within race. More likely, it represents the fact that white recruits are more likely than black recruits, on the average, to have met the background and aptitude requirements for "A" school training, particularly in the more technical ratings.

Classifier differences in final assignment. The only other factor upon which significant differences were obtained was the C/A factor. At San Diego and Great Lakes, this effect was significant for the final assignment criterion, and at Orlando it was significant for the racial saturation criterion. This finding indicates significant individual differences between classification specialists in their treatment of recruits, regardless of their own or the recruits' race.

Omega square (ω^2) values were computed to determine the proportion of the total variance accounted for by classifier differences. For the final assignment criterion, ω^2 values for the C factor were .013 at San Diego and .007 at Great Lakes. These correspond roughly to correlations of .12 and .09, respectively. For the racial saturation index criterion, the C effect had an ω^2 value of .006 at Orlando, corresponding roughly to a correlation of about .08. Thus, while these C/A effects are statistically

significant, they account for only about 1 percent of the criterion variance, and fall in a range that generally is regarded as not reflecting any practical significance. The statistical significance arose primarily due to the large sample sizes in the present investigation.

CONCLUSIONS

Within the limits of the conditions studied, there is no significant differential bias among classification specialists in their recommendations for, and assignment to, school training for black and white recruits. Sample sizes were so large that bias accounting for as little as 1 percent of the criterion variance would have been detected as significant. Thus, there was neither statistically nor practically significant bias present among classification specialists. Since samples were drawn from all three major Navy training centers, these findings can be considered to be generally true for Navy classification in these settings. Possible generalization to classification under other conditions, such as at the Navy recruiting stations, must await replicated studies in such settings.

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